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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/645,858	08/20/2003	Andre Bourdoux	IMEC282.001AUS	7704

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EXAMINER	
GHEBRETINSAE, TEMESGHEN	
ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
12/09/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/645,858	BOURDOUX ET AL.	
	Examiner	Art Unit	
	Temesghen Ghebretinsae	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-15,21-23 and 28-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-15,21-23,28-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

It would be of great assistance to the Office if all incoming papers pertaining to a filed application carried the following items:

1. Application number (checked for accuracy, including series code and serial no.).
2. Group art unit number (copied from most recent Office communication).
3. Filing date.
4. Name of the examiner who prepared the most recent Office action.
5. Title of invention.
6. Confirmation number (See MPEP § 503).

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/29/09 has been entered.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1,3-11, 13-15, 21-23, 28-38, and 40-42 are rejected under 35 U.S.C. § 102(e) as being anticipated by Walton et al (U.S. Pub. No. 2002/0154705; "Walton").

Regarding claim 1, Walton discloses a method of transmitting data signals from at least one transmitting terminal (fig. 3) with a spatial or "antenna" diversity (¶ 0042; ¶¶ 0046-47; ¶ 0052; fig. 3, ref. 116) capability to at least two receiving user terminals (¶ 0035; "a number of receiver units), each having a spatial diversity receiving capability (fig. 6, ref. 610), the method comprising: dividing (fig. 3, ref. 310) data signals (fig. 3, "AGGREGATE INPUT DATA STREAM") into a plurality of streams (fig. 3, "S1" – "Sk") of sub-user data sub-signals; determining combined data signals (fig. 3, refs. 332, 334, and 320; outputs from CHANNEL DATA PROC, "V1" - "Vnt" and/or outputs from IFFT blocks 320) in at least one transmitting terminal, said combined data signals being transformed versions of said streams of data sub-signals (¶ 0104), said determining being designed such that at least one spatial diversity device (i.e., fig. 6, refs. 610) of the receiving user terminals (fig. 6) only receives data sub-signals being specific for the corresponding receiving user terminal (¶ 0037; ¶ 0075) and having interference between at least two streams of the plurality of streams of sub-user data sub-signals (inherent; see discussion below); inverse sub-band processing (fig. 3, ref. 320) of said combined data signals; transmitting (fig. 3, ref. 116) with said at least one spatial diversity device said inverse sub-band processed combined data signals; receiving (fig. 6; ¶ 0123) data signals on at least one of said receiving terminals by at least one spatial diversity (fig. 6, ref. 610; spatial diversity is evidenced by the plurality of reception antennas 610) receiving device, said received data signals being at least a function of

said inverse subband processing of said combined data signals; determining (fig. 6, ref. 612) on at least one of said receiving terminals estimates or "demodulated samples" (¶ 0123) of said data sub-signals from said received data signals; and collecting (fig. 6, ref. 620) said estimates of said data sub-signals into estimates of said data signals (fig. 6, output of decoders 640). As broadly as claimed, each combined data signal must necessarily be "having interference between at least two streams of the plurality of streams" because, once all combined data signals are transmitted, they will (inherently) mix and interfere with each other.

Walton also discloses that said transmission of said inverse subband processed combined data signals is simultaneous because each of Walton's antennas (fig. 2, ref. 116) is capable of simultaneous transmission (¶ 0119, 0107).

Regarding claim 3, Walton discloses the limitations of claim 1 as applied above. Furthermore, Walton discloses the use of OFDM modulation (¶¶ 0048-49). As is notoriously known, OFDM subcarriers overlap, at least partly, in their individual bandwidths. (Official Notice is taken on this fact. See generally, U.S. Pub. No. 2003/0169824 to Chayat, fig. 3a, ref. 306 for a representation of overlapping OFDM subcarriers or subbands.)

Regarding claim 4, Walton discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Walton discloses that determining combined data signals in said transmitting terminal is carried out on a subband by subband basis (¶ 0049).

Regarding claim 5, Walton discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Walton discloses that determining said estimates of said data sub-signals in said receiving terminals comprises subband processing (i.e. "channelizes the stream . . . into a number of sub-channel symbol streams"; ¶ 0123).

Regarding claim 6, Walton discloses the limitations of claim 5 as applied above. Further, Walton discloses that said subband processing comprises orthogonal frequency division demultiplexing (i.e. “all sub-channel symbol streams used for the transmission of the channel data stream are presented to a MIMO processor that orthogonalizes the received modulation symbols in each sub-channel”; ¶ 0125). Specifically, Walton’s transmission of OFDM sub-channels or sub-bands requires an inverse OFDM demodulation technique on the side of reception.

Regarding claim 7, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that determining combined data signals in said transmitting terminal comprises: determining intermediate combined data signals (fig. 3, outputs of CHANNEL DATA PROC 332) by subband processing said data signals (¶ 0107); and determining said combined data signals (fig. 3, refs. 334 and 320) from said intermediate combined data signals (¶ 0102).

Regarding claim 8, Walton discloses the limitations of claim 7 as applied above. Further, Walton discloses, as broadly as claimed, that said subband processing by CHANNEL DATA PROC 332 comprises orthogonal frequency division demultiplexing (see fig. 4A, refs. 420 and 430). It performs the same operation as the subband

processing of the instant application. Namely, it determines the information for a subband which is to be "multiplexed" via OFDM multiplexing (¶ 0102 -0107).

Regarding claim 9, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that said inverse subband processing comprises orthogonal frequency division multiplexing (¶ 0104).

Regarding claim 10, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that said subbands, being involved in inverse subband processing, are grouped into sets, at least one set comprising at least two subbands (¶ 0102); determining combined data signals in said transmitting terminal comprises: determining relations (i.e. SPATIAL and COMBINATION relations; ¶¶ 0109-0114) between said data signals and said combined data signals on a set-by-set basis; and exploiting said relations between said data signals and said combined data signals for determining said data signals.

Regarding claim 11, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that in said inverse subband processed combined data signals a guard interval is introduced (fig. 3, ref. 322).

Regarding claim 13, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that the number of said streams of data sub-signals is variable because the implementation of combinations of the sub-signals is variable (¶ 0099). See generally, the description of figures 5A and 5B. Walton's diversity technique is flexible in that it can implement various types of diversity for particular users over particular periods of time (fig. 2).

Regarding claim 14, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that the number of said streams is selected in order to minimize the error between said estimates of said data sub-signals and said data sub-signals (¶ 0099, ¶ 0108).

Regarding claim 15, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that the number of said streams is selected in order to minimize the bit error rate (¶ 0099, ¶ 0108).

Regarding claim 21, Walton discloses the limitations of the claim as applied to claim 1 above. Furthermore, Walton discloses transmitting signals to at least two receiving user terminals (i.e., more than two antennas, fig. 6, refs. 610).

Regarding claim 22, Walton discloses the limitations of claim 21 as applied above. Further, Walton discloses that said circuitry configured to combine data signals comprises a plurality of circuits (fig. 3, refs. 332, 334, and 320) each configured to combine data signals based at least on part of the subbands of said data sub-signals as applied above.

Regarding claim 23, Walton discloses the limitations of claim 21 as applied above. Further, Walton discloses that said spatial diversity transmitter comprises at least two transmitters (fig. 3, refs. 114) and said circuitry configured to transmit inverse subband processed combined data signals comprises a plurality of circuits (fig. 3, refs. 320), each being configured to transmit said inverse subband processed combined data signals with one of said transmitters of said spatial diversity device.

Regarding claims 28-38, Walton discloses the limitations of the claims as applied, respectively, to claims 1-11 above.

Regarding claims 28-38, Walton discloses the limitations of the claims as applied, respectively, to claims 1-11 above.

Regarding claims 40-42, Walton discloses the limitations of claim 28 as applied above. Further, Walton discloses the remaining limitations of the claims as applied, respectively, to claims 13-15 above.

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3 Claims 1, 3-15, 21-23, 28-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Vandenameele (6,937,665).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Consider claims 1, 12, 21, and 28-29, 39. Vandenameele (6,937,665) discloses a system for transmitting data signals from at least one transmitting terminal (230) with a spatial diversity capability simultaneously to a plurality of receiving user terminals (330), each having a spatial diversity receiving capability, the system comprising:

means for dividing data signals into a plurality of streams of sub-user data sub- signals (inherent 200 data signal are divided); means for determining combined data signals in the at least one transmitting terminal, said combined data signals being transformed versions of said streams of data sub-signals, said determining being designed such that at least one spatial diversity device of the receiving user terminals only receives data sub-signals being specific for the corresponding receiving user terminal and having interference between at least two streams of the plurality of streams of sub-user data sub-signals; means for inverse subband processing (260) of said combined data signals; means for transmitting (220), simultaneously to the plurality of receiving terminals (330) with said ,at least one spatial diversity device said inverse subband processed combined data signals; means for receiving data signals (320,330) , simultaneously on each of the plurality of receiving terminals, by the spatial diversity receiving device of said receiving terminals said received data signals being at least a function of said inverse subband processed combined data signals; means for determining, on each of the plurality of receiving terminals, estimates of said data sub-signals from said received data signals; and means for collecting, on each of the plurality of receiving terminals, said estimates of said data sub-signals into estimates of said data signals(340,330,350) (see col.9, lines 25-45)

As per claim 23 Vandenameele discloses wherein said spatial diversity transmitter comprises at least two transmitters and said circuitry configured to transmit inverse subband processed combined data signals comprises a plurality of circuits,

each being configured to transmit said inverse subband processed combined data signals with one of said transmitters of said spatial diversity device (220)

As per claims, 3, 30, Vandenameele discloses wherein the spectra of said inverse subband processed combined data signals are at least partly overlapping (see col.9, lines 43-45).

As per claims 4, 22 and 31; 5 and 32; 6 and 33; 8 and 35; 9 and 36, Vandenameele discloses wherein said means for determining combined data signals in said transmitting terminal comprises means for determining on a subband by subband basis; and said means for determining said estimates of said data sub-signals in said receiving terminals comprises means for subband processing and said means for subband processing comprises orthogonal frequency division demultiplexing. (See col.9, lines 46-54 and col.10, lines 21-31)

As per claims 7 and 34 Vandenameele discloses means for determining combined data signals in said transmitting terminal comprises: means for determining intermediate combined data signals by subband processing said data signals; and means for determining said combined data signals from said intermediate combined data signals (see col.9, lines 48-54)

As per claims 10, and 37 Vandenameele discloses , wherein: said subbands, being involved in inverse subband processing, are grouped into sets, at least one set comprising at least two subbands; said means for determining combined data signals in said transmitting terminal comprises: means for determining relations between said data signals and said combined data signals on a set-by-set basis; and means for exploiting

said relations between said data signals and said combined data signals for determining said data signals (see col.13,, line 64 to col.14, line 9).

As per claims 11and 38, Vandenameele discloses wherein said means for inverse subband processing combined data signals comprises a guard interval (see claim 22).

As per claims 13 and 40, Vandenameele discloses, wherein the number of said streams of data sub-signals is variable (see col.6, lines 15-37)

As per claims 14-15 and 41-42 Vandenameele discloses wherein the number of said streams is selected in order to minimize the error between said estimates of said data sub-signals and said data sub- signals and to minimize the system bit error rate (see col.6, lines 15-37).

Claim Rejections - 35 USC § 103

4 The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5 Claims 12, 39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton in view of Walton et al (U.S. Pub. No. 2003/0125040; "Walton '040").

Regarding claim 12, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses the use of channel state information (CSI) in the sub-channel processing (¶ 0113). Walton does not explicitly disclose the transmitter and receiver linear filtering which is commonly associated with the use of CSI. However, Walton '040

discloses, in a strictly analogous field of art, the use of linear matched filters at the sides of the transmitter and receiver for channel characterization (¶ 0091). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made that the method of Walton could be modified to utilize linear transmitter and receiver filtering for determining the CSI as suggested by Walton '040 because it could accurately predict the channel. The transmitter filter and receiver filters are determined on a "per-user" basis because they are respective to each transmitter and receiver.

Regarding claim 39, Walton discloses the limitations of claim 28 as applied above. Further, Walton in view of Walton '040 discloses the remaining limitations of the claim as applied to claim 12 above.

Response to Arguments

6 Applicant's arguments filed 9/29/09 have been fully considered but they are not persuasive. Applicant argues that Walton does not teach **"transmitting, simultaneously to the plurality of receiving terminals, with said at least one spatial diversity device said inverse subband processed combined data signals"** as recited in Claim 1. However, examiner disagrees with applicant's conclusion because Walton does disclose such limitation (see paragraph 0119).

Conclusion

7 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Temesghen Ghebretinsae whose telephone number is 571-272-3017. The examiner can normally be reached on Monday-Friday 8:30 a.m. to 6:00 p.m. .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammed can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Temesghen Ghebretinsae
Primary Examiner
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12/3/09.